



DOE–FEMP's Geothermal Heat Pump (GHP) Technology-Specific Super ESCPs

Doug Culbreth
GHP Super ESCP Contracting Officer's Rep
Federal Energy Management Program



GHP Tech-Specific Super Energy Savings Performance Contracts (Super ESCPs)

- Streamlined Super ESCP procurement
 - Financing
 - Access to private-sector expertise
- FEMP Services support
 - Contracting Officer's Reps
 - FEMP Project Facilitators
 - FEMP GHP Core Team

August 17-20, 2003

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GHP Super-ESPC ESCOs

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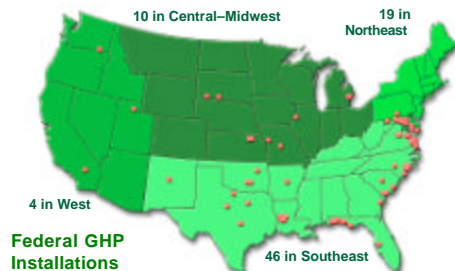
http://www.eere.energy.gov/femp/financing/espotech_contacts.html#gph

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GHPs are FEMP's most successful tech-specific program — federal investment in GHPs now totals more than \$200 million?



\$55 Million in GHP Super ESCP Projects

- | | |
|--|--------|
| • Patuxent River Naval Air Station | \$4.8 |
| • State Department, Seoul, Korea | \$5.6 |
| • Aberdeen Proving Grounds | \$5 |
| • Marine Air Corps Station Beaufort | \$11.2 |
| • Rock Island Arsenal | \$7.8 |
| • Carlisle Barracks, Army | \$9.4 |
| • Oceana Naval Air Station and Little Creek Amphibian Base | \$8.2 |
| • 8th Army, Korea | \$2.8 |

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GHPs offer numerous advantages

- Reduced energy cost
- Reduced energy demand
- Reduced maintenance costs
- Smaller machine room
- Simple if done right
- Low life-cycle cost
- Reliable, modular
- Improved comfort
- Recognition
 - Energy Star
 - LEED (1st Platinum)
- Progress on EO goals
 - Site energy reduction
 - Emissions reductions
 - Renewables

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GHPs are adaptable to almost any type of building — residential or commercial

- Military family housing
- Barracks
- Office buildings
- Etc.

GHPs can be configured to fit a wide range of sites and circumstances



Expertise of the GHP Core Team Ensures Success

- Benefits of GHPs are achieved only when the technology is applied properly
- The standard tools of the trade and experienced suppliers and installers were not available for GHPs
- The core team helps to make GHPs just as easy for federal facilities to procure and install as more conventional ECMs

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GHP Core Team Strategy

- Provide support to FEMP project facilitators for Super ESPC projects
- Provide technical assistance to other projects
- Use project data and experience to
 - prove techniques
 - provide data for tools and guides
 - Resolve technical issues to assist federal sites
- Leverage work already done or ongoing by GHPC, IGSHPA, ASHRAE, others

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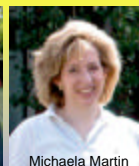
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GHP Core Team



John Shonder



Michaela Martin



Melissa Madgett

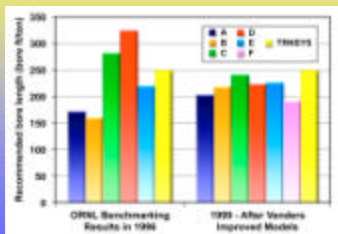


Mike Gregg

- Lead – John Shonder
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- Reviews of
 - Survey reports
 - In-situ test reports
 - Feasibility studies
 - Borefield sizing
 - Overall system design
 - Technical proposals
 - Price proposals
 - Baselines
 - Savings calculations
 - M&V

Example of Technical Assistance: Reliable Design Tools

- Ground loop size dominates system cost
- ORNL benchmarked widely used sizing methods in 1996 — sizes varied by 100%.
- Spurred by ORNL's study, vendors improved their methods significantly by 1999.



Success Story — Oceana Naval Air Station

- Investment — \$8,230,000 (GHP \$6,467,276)
- Price/Payment — \$14,785,546
- Incentive Fund Payment — \$823,000
- Construction Period Savings — \$588,000
- Savings — \$15,028,808

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Oceana Success Story

- ECM's — GHP, lighting, motors/drives, plug load, water, and HVAC
- Term — 14 years, 11 months
- Award Date — December 24, 2002
- Agency Contact — Bob Harvey

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Rules of Thumb

- Typical savings from replacing conventional HVAC systems with GHPs (total building energy use)
 - Nonresidential buildings — 15 - 25%
 - Residential — as high as 40%
- Spaces conditioned at least 40 hours per week are best candidates
- Replacing older, less efficient equipment is most economical

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Rules of Thumb

- Higher energy costs generally favor GHP economics
- Economics are improved by using waste heat generated during cooling (i.e., dumping heat into water heaters via desuperheaters)
- Bundling GHPs with ECMs with relatively short payback periods improves project economics
- Maintenance cost savings from GHPs are often significant and can make them the most cost-effective choice
- Capital cost is reduced if parts of existing system (i.e., ductwork) can be used with new GHPs



Getting Started

- Contact Doug Culbreth
 - 919-870-0051
 - carson.culbreth@ee.doe.gov
- Mini-feasibility studies can be done at no cost to the agency to determine whether GHPs will work at site
- Services of a FEMP project facilitator are FREE through the initial proposal stage

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FEMP HQ Contacts

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FEMP Web Site

<http://www.eren.doe.gov/femp/>

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